

This week:

I revise the slides according to Dr. Zhao's comments.

I make a poster for Berlin, the title is trajectory classifier: an efficient approach for understanding massive uncertain mobile trajectories. The existing work we have done is the semantic model and the query engine. We want to provide the user with an interactive way to classify the trajectories by inputting parameters or selecting the trajectories on the map. We also want to visualize the trajectories by their spatial density in order to make them more clearly.

Trajectory Classifier : An Efficient Approach for Understanding Massive Uncertain Mobile Trajectories

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Motivation

Find trajectories passing a train station in the morning.

Police Officer
I want to see the population flows of this station to provide better public services.

Traveler
I have a trip on tomorrow morning and I want to know how to get to the station fast.

Office Worker
I want to know where the people usually do when they get off the train.

Semantics
Residence community
OR
Businessarea?
The functionalities of spatial regions are difficult to distinguish.

Uncertainty
Inaccurate longitude and latitude
Inaccurate temporal attributes
Different analysis tasks
Voronoi diagram
Real Trajectory
Uncertain Trajectory

Visual Representation
Semantic information
Spatial-Temporal information
challenge:
Big volume
Multiple dimension

Semantic querying & Trajectory classification

Semantic Model

We extract the functionalities of spatial regions based on the related POIs through

Textualization

&
Topic Modeling

Trajectory Index

To enrich trajectory data with its contextual information, we transform a trajectory into a

Trajectory Documentation

Trajectory ID	The name list of POIs	The time list of POIs	Trajectory ID	The name list of POIs	The time list of POIs
Time stamp 0	Name1	Type1	Time stamp 1	Name1	Type1
Region 0	Name2	Type2	Region 1	Name2	Type2
	Name3	Type3		Name3	Type3
	Name4	Type4		Name4	Type4
	Name5	Type5		Name5	Type5
	Name6	Type6		Name6	Type6
	Name7	Type7		Name7	Type7
	Name8	Type8		Name8	Type8
	Name9	Type9		Name9	Type9
	Name10	Type10		Name10	Type10

The resultant document

Time stamp 0 - Region 0 - Name1 - Type1 - Time stamp 1 - Region 1 - Name2 - Type2 - ...

We use Data Partition by temporal attribute & Inverted Index

Keywords
e.g., covered POIs names, types

For each key word, we record the IDs of trajectories whose documents contain the keyword

Trajectory Classification & Visual Encoding

We classify the trajectories by employing clustering algorithm on their

Vectorized Representation.

$$S_T = ((S_{m_1}, t_1), (S_{m_2}, t_2), \dots, (S_{m_n}, t_n))$$

Where S_{m_i} and t_i denotes the extracted semantics (Topic model) of the corresponding region and the corresponding time stamps of mobile phone station m_i .

Visual encoding for visualizing the semantics of a trajectory

Glyph for visualizing the semantics of a set of trajectories.

Interactively Classification

Spatial Condition Specification

We want to allow the user specify the spatial or temporal attributes to classify the trajectories.

Trajectories taking a train
OR
just passing by a train station

Trajectories Representation

We want to represent the massive trajectories on the map by their spatial density.

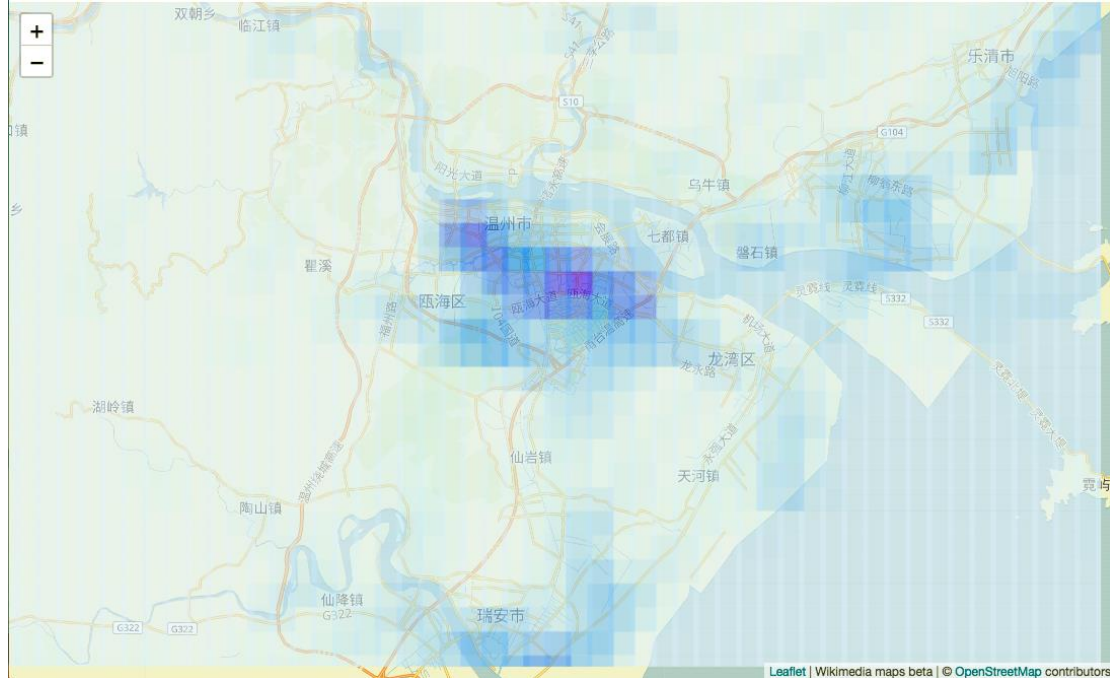
Two clustering groups can be found

Interactively Classification

We want to provide the user with an interactive interface to specify the classification parameters and classify or group the trajectories.

I proofread one of the Monograph.

I talk about the work that I want to do with Yu Kejie, Gong Youcheng, Liu Liyan, and send two papers to Xu Weixia. We discuss the works on Tuesday and I assign some coding works. Yu Kejie already has some progress. He visualizes the trajectories with spatial density. He will try to do this with a bigger zoom level.



I build a framework on Github for their cooperation.

I set up a computer for Dr. Xia's student. He will remote connect and process the trajectories data on the computer in our lab.

Some paper work for the college of computer science and technology.

Paper reading:

< EmbeddingVis: A Visual Analytics Approach to Comparative Network Embedding Inspection >

This paper design a system that supports the visual interpretation of embedding vectors at the cluster, instance, and structural levels. It can compare different embedding models and investigate the relationships between node metrics and selected embedding vectors.

< T-Drive: Driving Directions Based on Taxi Trajectories >

This paper is about map matching. We can consider to use this paper to visualize massive trajectories.

Slides	Done	10.22
poster	Done	
proofread	Done	
Trajectory classification	Discuss and build a framework on Github	
Data for Dr. Xia	Done	

Work hour:

8:30-20:30